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ABSTRACT

Libraries faced with the challenge of cooperative cataloging must maintain a high degree of unification within the library network (consortium) without compromising local libraries' independence. This paper compares a traditional model for cooperative catalogs achieved by means of a Union Catalog that depends entirely on replication of data between the local libraries and the Union catalog, with a more advanced concept, the Virtual Cooperate Catalog (VCC) that includes an engine that enables a unified search and retrieval of records across diverse local library catalogs and systems. The two models are in fact complementary in their achievements. The ALEPH500 library information system contains a special component, the ALEPH-Net proposes a flexible model that can be tuned in order to achieve the best balancing between virtuality and the reality of data: a Network Cooperative Catalog (NCC). The basic conceptual and technological elements that underline the NCC consist of a distributed database design, links to other records, and an "Expand" option. (AEF)

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ADAPTABLE NETWORK COOPERATE CATALOG FOR COMPLEX INFORMATION OBJECTS

From Single Library to a Consortium: Sharing the Management and Distribution of Information Resources

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The Problem

With the rapid development of communication technology there is a growing trend to share intellectual/information resources. The Internet in general and the WWW in particular opened new ways to share these resources. Organizations who's business is to supply information and knowledge are building new consortiums to deliver information in an efficient way i.e., fast, comprehensive and in the lowest cost possible. New tools are in order to manage shared resources in library networks (library consortium).

The need to team up stems from the growing amount of information and the growing costs of purchasing it. No one institution can afford to purchase, store and manage all the documents it will ideally want to hold. At the same time, library patrons demanded access to a wide range of information resources and services (including material lending, document delivery, etc.) exceeding their immediate organizational affiliation.

In order to share catalog records within a library network (consortium), a certain degree of unification of the resources and their representation is due. Despite the widely used library cataloging rules and standards, there is a notable discrepancy in the bibliographic, as well as holdings description between the different local library catalogs. Unification of record description, known also as the de-duplication problem, is a must in order to eliminate duplication of records and information presented to the patron (the same book should be listed only once in the result set even if it happens to be cataloged in more than one library catalog, although it should contain "pointers" to all libraries owning it).

But, the growing demand to share resources does not eliminate the common desire to preserve organizational autonomy. Each organization (local library), within a consortium wants to preserve its unique way of information management. The fact that the vast majority of Library material is still stored as physical entities reinforces the requirement to preserve libraries' autonomy.

Thus, we are faced with the challenge of increased cooperative cataloging, requiring higher degree of unification without compromising local libraries independence.

Existing Solutions

A traditional model for cooperative catalogs is achieved by means of a Union Catalog which depends entirely on replication of data between the local libraries and the Union catalog. All relevant data that is to be searched and displayed on the Union catalog is stored there, in addition to its existence in the local libraries.

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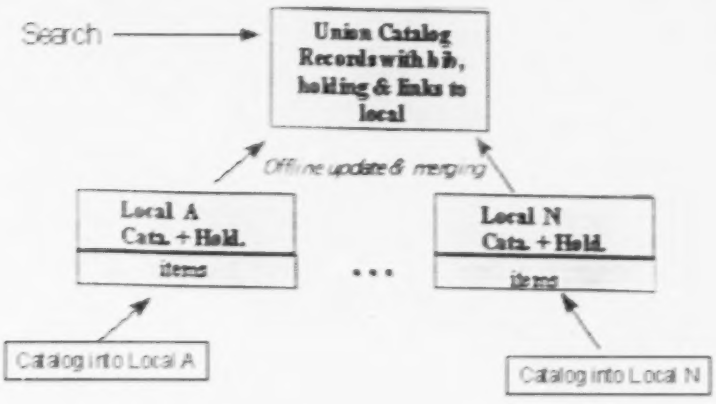
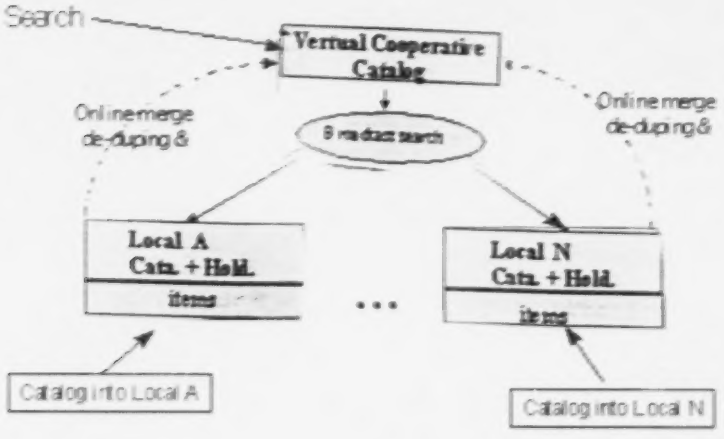
Traditional Union Catalog



There are, however, several drawbacks to this model: every update in records in the local libraries, e.g. new items added, data correction, change of availability status, etc., have to be reflected in the union catalog's "parallel" record, therefore heavy update traffic is induced. In addition, data replication require allocation of additional storage resources and allows for a lesser degree of independence for the local libraries, thus inflicts relative inflexibility.

A more advanced concept that is currently explored within the library information retrieval community is the Virtual Cooperate Catalog (VCC). A VCC includes an engine that enables a unified search and retrieval of records across diverse local library catalogs and systems. It receives queries, broadcasts them to the target libraries, merges the result sets in a unified set and presents it to the patrons in a unified format. The VCC contains no data and therefore changes in records in the local libraries does not require any update within the VCC.

Network Cooperative Catalog



A VCC, when based on open standards such as Z39.50 and HTTP, potentially provides maximum flexibility for the organizations who are wishing to share resources. Although maximum flexibility is maintained in this model there are notable disadvantages: Since the VCC contains no data, all searches, retrievals, de-duplication and data merging, sorting and presentation, is done "on the fly" at the point of the query. This induces heavy traffic between the VCC and the participating local libraries, as well as extensive utilization of CPU to process the information before presented to the users which render the whole solution unfeasible.

The ALEPH Solution

The two models, the VCC and the Traditional Union Catalog, are in fact complementary in their achievements: The traditional union catalog, indeed speeds up Search time, since data and indexes are stored in the union catalog environment but this design more rigid and requires replication of data and update of all changes done within the local libraries. The VCC allows for greater flexibility and independence of the local libraries and reduces the update traffic to minimum, but, it requires significant network resources to transfer data, on the time of request, and requires processing resources to merge and de-duplicate data, sort it and present it to the patrons.

ALEPH500 library information system contains a special component, the ALEPH-Net, which offers a compromise between the two complementary, contradicting models for cooperative cataloging. It proposes a flexible model that can be tuned in order to achieve the best balancing between Virtuality and reality of data: a Network Cooperative Catalog (NCC).

The basic conceptual and technological elements that underline the NCC are:

1. Distributed database design: In ALEPH, authority, bibliographic, holdings and administrative (circulation control, serials management, acquisition, etc.) data are maintained as separate, independent yet inter-related database units: Each such unit can have many occurrences with many-to-many links to the other database units. For example, one bibliographic catalog (i.e. Bibliographic databases unit) can be related to N number of administrative units which relate to N Libraries, each with its own administrative policies. ALEPH database design supports wide range of

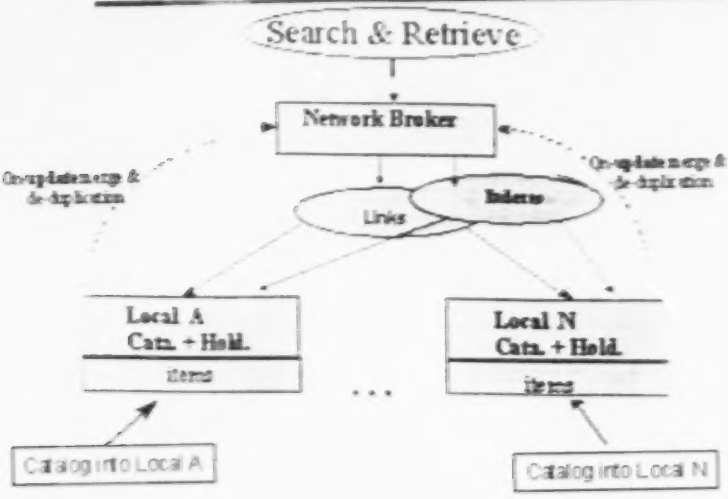
database configurations and implementations, including independent installation of the different units on different hosts. ALEPH database design plays an important role also in its scaleability potential..

2. ALEPH-Links: In ALEPH, every record, within any database unit can be linked to any other record, within any other database unit. In practice, records which relate to one another are linked in one of a number of link-relationships (e.g. up, down, parallel, analytic, item, etc.) These links project a graph structure (or a Web of linked records), which defines for each database record its network neighbors with the relevant relation between the records. Whenever a record is updated a message to all its network neighbors is triggered, so that all its related, or linked records are informed of the modification. In addition, ALEPH-links is translated to hyper-links between records, for Navigation purposes, while displaying.

3. EXPAND option: all ALEPH application objects which relate to data indexing and data display include an EXPNAD method. With this option, a library can opt to add to any database object, information derived from any of its network neighbors. This prevails both for display and indexing purposes. For example, a bibliographic record of a monograph is linked to 3 administrative records describing 3 different copies of the book. EXPAND can be invoked to add to the monograph's bibliographic catalog indexes, also information which is included in the related administrative records, such as Barcode numbers, location or availability status, so that Patron could search the bibliographic record based on these data. EXPAND can also serve to "Virtually" incorporate external, non-ALEPH data into an ALEPH record. For example, to add the table of contents of a journal issue from a third party indexing and abstracting agency.

The basic design of an NCC model is composed of two components: the local libraries databases and a Network Broker database. The Network Broker serves as a Search Engine across the entire library network. Whenever a record is created/updated in one of the local libraries, a special de-duplication process is triggered, to check if this record is already present in the Network Broker. If it is, an ALEPH-Link is defined between the two records. If not, a new record is created in the Network Broker and is linked to the local record. NOTE: the Network record does not contain any data except for the link! Based on the ALEPH-links relationships, EXPAND is invoked and adds, for each Network Broker record, indexes derived from all network neighbors, i.e. from all its linked (local) records. The Network Broker contains indexes for all records in all participating local libraries, without relying on any replication of data. This means that the process of de-duplication is achieved during the index creation and updating, prior and not during the search! In addition, since indexes are maintained in the Network Broker component, search queries do not involve any networking. The effect of the above design is that search results contain one representative for every identical record within the network with additional options to **navigate** to the desired target local library record or just to display its bibliographic and/or holdings content of the record (**expanded** from the relevant local libraries).

ALEPH Network Cooperative Catalog



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